

Application No.: 10/625,234

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REMARKS

Claims 1-8 are pending in the present application. Claims 5-8 are withdrawn from consideration. By this response, new claims 9-20 have been added. Accordingly, claims 1-4 and 9-20 are currently under consideration, while claims 5-8 are pending but have been withdrawn from consideration. Amendment and cancellation of certain claims is not to be construed as a dedication to the public of any of the subject matter of the claims as previously presented. No new matter has been added.

Support for the subject matter of claims 9-12 is found at e.g. original claims 5-8 as well as paragraphs 31-37. Support for the subject matter of claims 13-20 is found at e.g. the same locations (see especially paragraph 32 in which devices from separate lots include a device with normal oscillation threshold current and a device with a higher threshold current; higher threshold current is due to a method of making the device that does not include washing with wash water of prescribed resistivity).

Rejections under 35 U.S.C. §103(a)

The Office has rejected claims 1-4 as allegedly being unpatentable over Bestwick et al. (5,888,844). The Office Action in discussing Bestwick et al. cites col. 2 lines 43-50 for the portion of the specification indicating that impurities, especially carbon and oxygen based impurities, are present.

Applicant respectfully traverses the rejection.

The cited portion of Bestwick et al. does not necessarily lead one to conclude that carbon or oxygen based impurities are present in the device structure after etching to form a striped ridge structure. The portion of Bestwick et al. that was cited in the Office Action as support for oxygen or carbon-containing impurities being present discusses EP-607662 and states that a mixture of SiCl_4 , CF_4 , O_2 , and an inert gas such as He may be used when selectively etching GaAs over AlGaAs.

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It is not at all certain from either Bestwick et al. or from EP-607662 that the gas mixture of Bestwick et al. would be used in forming a striped ridge structure. EP-607662 only states that the etch mixture is effective for selectively etching GaAs over AlGaAs as used in devices as found in microwave and opto-electronic applications. The gas mixture in EP-607662 was used to form a field-effect transistor structure as discussed in the "Detailed Description" portion of EP-607662. Neither Bestwick et al. nor EP-607662 states or implies that the gas mixture as used to etch transistors in EP-607662 would or should be adopted to etch a stacked ridge structure in a semiconductor laser device.

In fact, Bestwick et al. adopted an etching mixture that lacked both O₂ and CF₄ when forming a striped ridge structure. Bestwick et al. etched a structure containing layers of GaAs 7, GaInP 6, and AlGaInP 4 using a gas of either SiCl₄ alone or a mixture of SiCl₄ and He, and Bestwick et al. utilized a GaInP etch-stop layer 5. Bestwick et al. never suggests using an etching gas that could be a potential source of carbon or oxygen contamination and only describes alternatives to the He utilized in the examples (see Bestwick et al. column 6 lines 16-18 and column 5 lines 37-43).

Bestwick et al. therefore does not suggest adopting a gas mixture for etching a striped ridge structure that might contain O₂ or CF₄ that might theoretically contaminate an interface of the striped ridge structure with a contaminant containing oxygen or a contaminant containing carbon. Bestwick et al. consequently does not render the claimed subject matter obvious.

Bestwick et al. does disclose that a wet chemical etch of the striped ridge structure can improve smoothness of the etched surface (column 4 lines 54-59 and column 5 lines 14-16). Applicant learned that a wet chemical etch followed by a wash can be the source of contamination (see, e.g., paragraphs 32-37 and 39-41). Bestwick et al. does not teach or suggest anything about contamination or a source of contamination, and therefore Bestwick et al. teaches nothing about the presence of contaminants such as oxygen-containing or carbon-containing contaminants.

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Since Bestwick et al. does not disclose anything that leads a person of ordinary skill to conclude that there is a source of contamination after etching a striped ridge structure that affects device performance, Bestwick et al. does not render obvious a device in which contaminants in a particular location in the device are kept below a specified value. Bestwick et al. therefore does not render the claimed device unpatentable under 35 U.S.C. Sec. 103(a).

A second reason that the subject matter is patentable over Bestwick et al. is that Applicant has provided information on how well a device performs when it has a concentration of contaminant of less than $1 \times 10^{17}/\text{cm}^3$. Figures 3A and 3B show how oscillation threshold current remains low up to a concentration of contaminant of about $1 \times 10^{17}/\text{cm}^3$, at which point the oscillation threshold current increases significantly. Higher threshold current has been linked to higher malfunction rate in semiconductor laser devices (see the previously-cited paragraphs of Applicant's specification). Bestwick et al. contains nothing that would suggest there was a contaminant level at which threshold current increased markedly or at which device reliability changes.

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CONCLUSION

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue. If it is determined that a telephone conference would expedite the prosecution of this application, the Examiner is invited to telephone the undersigned at the number given below.

In the event the U.S. Patent and Trademark office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to Deposit Account No. 03-1952 referencing docket no. 29900-2056700. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

Dated: January 5, 2005

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